CLAIMS

1. A reflector having a concave/convex shape in a surface thereof, characterized in that

at least part of concave portions or convex portions of the concave/convex shape are arranged according to a predetermined rule, and the concave/convex shape of an arbitrary straight-line cross section is irregular.

2. A reflector having a concave/convex shape in a surface thereof, characterized in that

at least part of concave portions or convex portions of the concave/convex shape are arranged according to a predetermined rule and concave/convex shapes of arbitrary parallel straight-line cross sections do not have the same regularity.

3. The reflector according to Claim 1, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged in a substantially spiral shape.

4. The reflector according to Claim 3, including the concave portions or the convex portions in which a central angle made between a **n-th** concave/convex portion and a **(n + 1)-th** concave/convex portion is a multiple of 137.5 degrees when the concave portions or the convex portions are numbered using **n** according to a distance from a center of the spiral.

5. The reflector according to Claim 3, including the concave portions or the convex portions in which a distance from a center of the spiral to a concave/convex portion is proportional to a square root of **n**

when the concave portions or the convex portions are numbered using **n** according to the distance from the center of the spiral.

6. The reflector according to Claim 1, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are regularly arranged in a substantially concentric shape.

7. The reflector according to Claim 1, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged in a substantially radial shape.

8. The reflector according to Claim 1, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged in a substantially ellipsoidal spiral shape or in a substantially ellipsoidal radial shape.

9. The reflector according to Claim 1, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged so as to have a positional relationship similar to a plurality of points on an arbitrary two-dimensional coordinate system obtained when a radius of a coordinate from an origin is a square root of **n** as a natural number and a phase angle is 137.5 degrees $\times$ **n** on the arbitrary two-dimensional coordinate system.

10. The reflector according to Claim 1, wherein more than half of all the concave portions or the convex portions are arranged according to the predetermined rule.

11. The reflector according to Claim 1, wherein the concave portions or the convex portions of the concave/convex shape are repeatedly

arranged in matrix.

12. The reflector according to Claim 1, wherein the concave portions or the convex portions of the concave/convex shape are formed through a process including mask exposure and development, the mask exposure using a photomask including light-blocking regions or light-transmitting regions at least part of which are arranged according to a predetermined rule.

13. The reflector according to Claim 2, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged in a substantially spiral shape.

14. The reflector according to Claim 13, including the concave portions or the convex portions in which a central angle made between a **n-th** concave/convex portion and a **(n + 1)-th** concave/convex portion is a multiple of 137.5 degrees when the concave portions or the convex portions are numbered using **n** according to a distance from a center of the spiral.

15. The reflector according to Claim 13, including the concave portions or the convex portions in which a distance from a center of the spiral to a concave/convex portion is proportional to a square root of **n** when the concave portions or the convex portion are numbered using **n** according to the distance from the center of the spiral.

16. The reflector according to Claim 2, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are regularly arranged in a substantially concentric shape.

17. The reflector according to Claim 2, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged in a substantially radial shape.

18. The reflector according to Claim 2, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged in a substantially ellipsoidal spiral shape or in a substantially ellipsoidal radial shape.

19. The reflector according to Claim 2, wherein the at least part of the concave portions or the convex portions of the concave/convex shape are arranged so as to have positional relationship similar to a plurality of points on an arbitrary two-dimensional coordinate system obtained when a radius of a coordinate from an origin is a square root of **n** as a natural number and a phase angle is 137.5 degrees $\times$**n** on the arbitrary two-dimensional coordinate system.

20. The reflector according to Claim 2, wherein more than half of all the concave portions or the convex portions are arranged according to the predetermined rule.

21. The reflector according to Claim 2, wherein the concave portions or convex portions of the concave/convex shape are formed through a process including mask exposure and development, the mask exposure using a photomask including light-blocking regions or light-transmitting regions at least part of which are arranged according to a predetermined rule.

22. A reflector in which a plurality of unit regions having a

concave/convex shape are formed in a surface thereof, characterized in that

all the unit regions have the same concave/convex shape, and

at least part of concave portions or convex portions of the concave/convex shape in the unit region are arranged according to a predetermined rule and concave/convex shapes of arbitrary parallel straight-line cross sections do not have the same regularity.

23. The reflector according to Claim 22, wherein the unit regions are formed in matrix in the surface.

24. A method for fabricating a reflector having a concave/convex shape in a surface thereof, characterized in that

the concave/convex shape is provided such that at least part of concave portions or convex portions are arranged according to a predetermined rule and the concave-convex shape of an arbitrary cross section is irregular.

25. The method for fabricating the reflector according to Claim 24, comprising:

performing a process including mask exposure and development, the mask exposure using a photomask including light-blocking regions or light-transmitting regions such that at least part of the regions are arranged according to a predetermined rule and the regions on an arbitrary straight line in an arrangement plane are irregularly arranged, to thereby provide a concave/convex shape so as to have the concave portions or the convex portions at positions corresponding to the light-blocking regions or the light-transmitting regions of the photomask on the surface of a substrate; and

forming a reflecting film on a surface of the concave/convex

shape.

26. A method for fabricating a reflector having a concave/convex shape in a surface thereof, characterized in that

the concave/convex shape is provided such that at least part of concave portions or convex portions are arranged according to a predetermined rule and the same regularity is not repeated in arbitrary parallel straight-line cross sections.

27. The method for fabricating the reflector according to Claim 26, comprising:

performing a process including mask exposure and development, the mask exposure using a photomask including light-blocking regions or light-transmitting regions arranged such that at least part of the regions are arranged according to a predetermined rule and the regions on arbitrary parallel straight lines in an arrangement plane do not have the same regularity, to thereby provide the concave/convex shape so as to have concave portions or convex portions at positions corresponding to the light-blocking regions or the light-transmitting regions of the photomask on a surface of a substrate; and

forming a reflecting film on the surface of the concave/convex shape.

28. A reflective liquid crystal display panel comprising:

a liquid crystal layer and a reflector placed substantially in parallel with the liquid crystal layer, in which an ambient light is reflected externally by the reflector through the liquid crystal layer, and the liquid crystal layer can be modulated by an externally applied voltage, characterized in that

the reflector has a concave/convex shape in a surface thereof,

at least part of concave portions or convex portions of the concave/convex shape are arranged according to a predetermined rule, and the concave/convex shape of an arbitrary straight-line cross section is irregular.

29. The reflective liquid crystal display panel according to Claim 28, wherein the reflector includes a reflecting film on a substrate, for reflecting the ambient light, an opposed substrate is placed opposite to the reflector with the liquid crystal layer interposed therebetween, and an electrode for modulating the liquid crystal layer is comprised of the reflecting film and a common electrode formed on an inner surface of the opposed substrate.

30. A reflective liquid crystal display panel comprising:

a liquid crystal layer and a reflector placed substantially in parallel with the liquid crystal layer, in which an ambient light is reflected externally by the reflector through the liquid crystal layer, and the liquid crystal layer can be modulated by an externally applied voltage, characterized in that

the reflector has a concave/convex shape in a surface thereof, at least part of concave portions or convex portions of the concave/convex shape are arranged according to a predetermined rule and concave/convex shapes of parallel straight-line cross sections do not have the same regularity.

31. The reflective liquid crystal display panel according to Claim 30, wherein the reflector includes a reflecting film on a substrate, for reflecting the ambient light, an opposed substrate is placed opposite to the reflector with the liquid crystal layer interposed therebetween, and an electrode for modulating the liquid crystal layer

is comprised of the reflecting film and a common electrode formed on an inner surface of the opposed substrate.

32. A method for fabricating a reflective liquid crystal display panel comprising:

performing a process including mask exposure and development, the mask exposure using a photomask including light-blocking regions or light-transmitting regions arranged such that at least part of the regions are arranged according to a predetermined rule and the regions on an arbitrary straight line in an arrangement plane is irregularly arranged, to thereby provide a concave/convex shape so as to have the concave portions or the convex portions at positions corresponding to the light-blocking regions or the light-transmitting regions on a surface of a substrate;

forming a reflecting film on the surface of the concave/convex shape;

placing an opposed substrate having a common electrode on an inner surface thereof as being opposed to a surface of the substrate on which the reflecting film is formed; and

filling a liquid crystal into a spacing between the substrate and the opposed substrate.

33. A method for fabricating a reflective liquid crystal display panel comprising:

performing a process including mask exposure and development, the mask exposure using a photomask including light-blocking regions or light-transmitting regions arranged such that at least part of the regions are arranged according to a predetermined rule and the regions on arbitrary parallel straight lines in an arrangement plane do not have the same regularity, to thereby provide a concave/convex

shape so as to have concave portions or convex portions at positions corresponding to the light-blocking regions or the light-transmitting regions on a surface of a substrate;

forming a reflecting film on the surface of the concave/convex shape;

placing an opposed substrate having a common electrode on an inner surface thereof as being opposed to a surface of the substrate on which the reflecting film is formed; and

filling a liquid crystal into a spacing between the substrate and the opposed substrate.

34. A reflective liquid crystal display comprising:

a reflective liquid crystal display panel including a liquid crystal layer and a reflector placed substantially in parallel with the liquid crystal layer, in which an ambient light is reflected externally by the reflector through the liquid crystal layer, the liquid crystal layer can be modulated by an externally applied voltage, the reflector has a concave/convex shape in a surface thereof, at least part of concave portions or convex portions of the concave/convex shape are arranged according to a predetermined rule, and the concave/convex shape of an arbitrary straight-line cross section is irregular; and

drive means for driving the reflective liquid crystal display panel by applying a voltage for modulating the liquid crystal layer.

35. A reflective liquid crystal display comprising:

a reflective liquid crystal display panel including a liquid crystal layer and a reflector placed substantially in parallel with the liquid crystal layer, in which an ambient light is reflected externally by the reflector through the liquid crystal layer, the

liquid crystal layer can be modulated by an externally applied voltage, the reflector has a concave/convex shape in a surface thereof, at least part of concave portions or convex portions of the concave/convex shape are arranged according to a predetermined rule, and concave/convex shapes of arbitrary parallel straight-line cross sections do not have the same regularity; and

drive means for driving the reflective liquid crystal display panel by applying a voltage for modulating the liquid crystal layer.

36. An optical member characterized in that

an optical characteristic in an observation point direction varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule and the optical action centers on an arbitrary straight line in the plane are arranged irregularly.

37. An optical member characterized in that

an optical characteristic in an observation point direction varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and the optical action centers on arbitrary parallel straight lines in the plane do not have the same regularity.

38. The optical member according to Claim 36, wherein the optical characteristic varies substantially discontinuously at a boundary between a minute region having the optical action center as a center and the other region, and has substantially the same value in each region.

39. The optical member according to Claim 36, wherein at least part of the optical action centers may be arranged in a substantially spiral shape.

40. The optical member according to Claim 39, including the optical action centers in which a central angle made between a **n-th** optical action center and a **(n + 1)-th** optical action center is a multiple of 137.5 degrees when the optical action centers are numbered using **n** according to a distance from a center of the spiral.

41. The optical member according to Claim 39, including the optical action centers in which a distance from a center of the spiral to an optical action center is proportional to a square root of **n** when the optical action centers are numbered using **n** according to the distance from the center of the spiral.

42. The optical member according to Claim 36, wherein at least part of the optical action centers are regularly arranged in a substantially concentric shape.

43. The optical member according to Claim 36, wherein at least part of the optical action centers are arranged in a substantially radial shape.

44. The optical member according to Claim 36, wherein at least part of the optical action centers are arranged in a substantially ellipsoidal spiral shape or in a substantially ellipsoidal radial shape.

45. The optical member according to Claim 36, wherein at least part of the optical action centers are arranged so as to have positional relationship similar to a plurality of points on an arbitrary two-dimensional coordinate system obtained when a radius of a coordinate from an origin is a square root of **n** as a natural number and a phase angle is 137.5 degrees $\times$ **n** on the arbitrary two-dimensional coordinate system.

46. The optical member according to Claim 36, wherein at least part of the optical action centers are arranged so as to have positional relationship similar to arrangement obtained by symmetric transformation of a plurality of points regularly arranged in a concentric shape on an arbitrary two-dimensional coordinate system.

47. The optical member according to Claim 36, wherein the optical action centers are repeatedly arranged in matrix.

48. The optical member according to Claim 36, wherein the optical characteristic is a reflectance.

49. The optical member according to Claim 36, wherein the optical characteristic is a refractive index.

50. The optical member according to Claim 36, wherein the optical characteristic is a transmittance.

51. The optical member according to Claim 37, wherein the optical characteristic varies substantially discontinuously at a boundary between a minute region having the optical action center as a center and the other region, and has substantially the same value

in each region.

52. The optical member according to Claim 37, wherein at least part of the optical action centers are arranged in a substantially spiral shape.

53. The optical member according to Claim 52, including the optical action centers in which a central angle made between a **n-th** optical action center and a **(n + 1)-th** optical action center is a multiple of 137.5 degrees when the optical action centers are numbered using **n** according to a distance from a center of the spiral.

54. The optical member according to Claim 52, including the optical action centers in which a distance from a center of the spiral to an optical action center is proportional to a square root of **n** when the optical action centers are numbered using **n** according to the distance from the center of the spiral.

55. The optical member according to Claim 37, wherein at least part of the optical action centers are regularly arranged in a substantially concentric shape.

56. The optical member according to Claim 37, wherein at least part of the optical action centers are arranged in a substantially radial shape.

57. The optical member according to Claim 37, wherein at least part of the optical action centers are arranged in a substantially ellipsoidal spiral shape or in a substantially ellipsoidal radial shape.

58. The optical member according to Claim 37, wherein at least part of the optical action centers are arranged so as to have positional relationship similar to a plurality of points on an arbitrary two-dimensional coordinate system obtained when a radius of a coordinate from an origin is a square root of **n** as a natural number and a phase angle is 137.5 degrees $\times$ **n** on the arbitrary two-dimensional coordinate system.

59. The optical member according to Claim 37, wherein at least part of the optical action centers are arranged so as to have positional relationship similar to arrangement obtained by symmetric transformation of a plurality of points regularly arranged in a concentric shape on an arbitrary two-dimensional coordinate system.

60. The optical member according to Claim 37, wherein the optical characteristic is a reflectance.

61. The optical member according to Claim 37, wherein the optical characteristic is a refractive index.

62. The optical member according to Claim 37, wherein the optical characteristic is a transmittance.

63. An optical member characterized in that

an optical characteristic in an observation point direction varies for each plural unit regions in a plane, the optical characteristic is the same in all the unit regions, and at least part of optical action centers at which the optical characteristic in a unit region has a local maximum value or a local minimum value are

arranged in a plane of the unit region according to a predetermined rule and arrangements of the optical action centers on arbitrary parallel straight lines in the plane of the unit region do not have the same regularity.

64. The optical member according to Claim 63, wherein the unit regions are formed in matrix in the plane.

65. A display comprising:

display means for displaying predetermined information; and

an optical member placed on a light path of light for displaying the information, in which an optical characteristic in a direction in which the displayed information is observed varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and the optical action centers on an arbitrary straight line in the plane are irregularly arranged.

66. A display comprising:

display means for displaying predetermined information; and

an optical member placed on a light path of light for displaying the information, in which an optical characteristic in a direction in which the displayed information is observed varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and arrangements of the optical action centers on arbitrary parallel straight lines in the plane do not have the same regularity.

67. An illuminating device comprising:

light emitting means for emitting light; and

an optical member placed on a light path of the emitted light, in which an optical characteristic in a direction in which displayed information is observed varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and the optical action centers on an arbitrary straight line in the plane are arranged irregularly.

68. An illuminating device comprising:

light emitting means for emitting light; and

an optical member placed on a light path of the emitted light, in which an optical characteristic in a direction in which displayed information is observed varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and arrangements of the optical action centers on arbitrary parallel straight lines in the plane do not have the same regularity.

69. A display panel comprising:

light emitting means for emitting light; and

an optical member placed on a light path of the emitted light, in which an optical characteristic in a direction in which displayed information is observed varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule and the optical action centers on an arbitrary straight line in the plane are arranged irregularly, and the optical

action centers are distributed in a predetermined display pattern.

70. A display panel comprising:

light emitting means for emitting light; and

an optical member placed on a light path of the emitted light, in which an optical characteristic in a direction in which displayed information is observed varies in a plane, at least part of optical action centers at which the optical characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, arrangements of the optical action centers on arbitrary parallel straight lines in the plane do not have the same regularity, and the optical action centers are distributed in a predetermined display pattern.

71. A wave member characterized in that

a radiation characteristic of a wave varies in a plane, at least part of wave action centers at which the radiation characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and the wave action centers on an arbitrary straight line in the plane are irregularly arranged.

72. A wave member characterized in that

a radiation characteristic of a wave varies in a plane, at least part of wave action centers at which the radiation characteristic has a local maximum value or a local minimum value are arranged in the plane according to a predetermined rule, and arrangements of the wave action centers on arbitrary parallel straight lines in the plane do not have the same regularity.

73. The wave member according to Claim 71, wherein the radiation characteristic varies substantially discontinuously at a boundary between a minute region having the wave action center as a center and the other region, and has substantially the same value in each region.

74. The wave member according to Claim 71, wherein at least part of the wave action centers are regularly arranged in a concentric shape.

75. The wave member according to Claim 71, wherein the wave is a sound wave, and the wave member constitutes an acoustic member.

76. The wave member according to Claim 71, wherein the wave is an electromagnetic wave, and the wave member constitutes an electromagnetic wave member.

77. The wave member according to Claim 71, wherein the wave is an oscillation and the wave member constitutes an oscillating member.

78. The wave member according to Clam 71, wherein the wave is a radio wave and the wave member constitutes a radio wave member.

79. The wave member according to Claim 72, wherein the radiation characteristic varies substantially discontinuously at a boundary between a minute region having the wave action center as a center and the other region, and has substantially the same value in each region.

80. The wave member according to Claim 72, wherein at least part of the wave action centers are regularly arranged in a concentric shape.

81. The wave member according to Claim 72, wherein the wave is a sound wave and the wave member constitutes an acoustic member.

82. The wave member according to Claim 72, wherein the wave is an electromagnetic wave and the wave member constitutes an electromagnetic wave member.

83. The wave member according to Claim 72, wherein the wave is oscillation and the wave member constitutes an oscillating member.

84. The wave member according to Claim 72, wherein the wave is a radio wave and the wave member constitutes a radio wave member.